

## **Gas-phase alkali halide assisted stable precursor supply from zirconium carbide for the synthesis of 2D large-sized ZrS<sub>2</sub> nanosheets**

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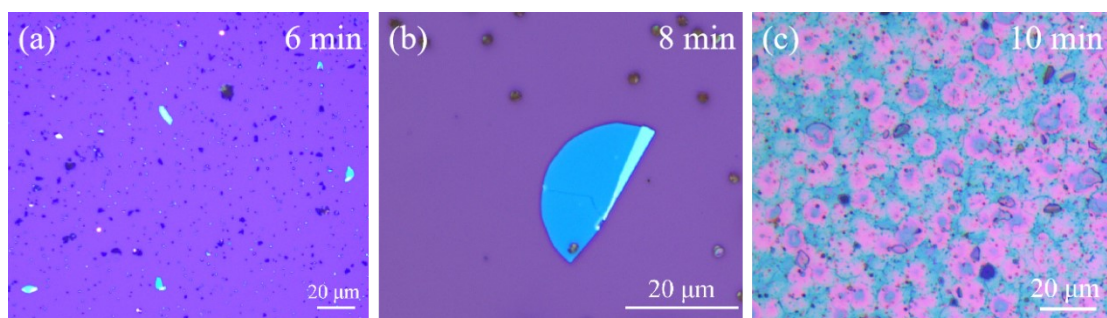


Figure S1. Optical micrographs of morphological changes in  $\text{ZrS}_2$  nanosheets at different growth times.

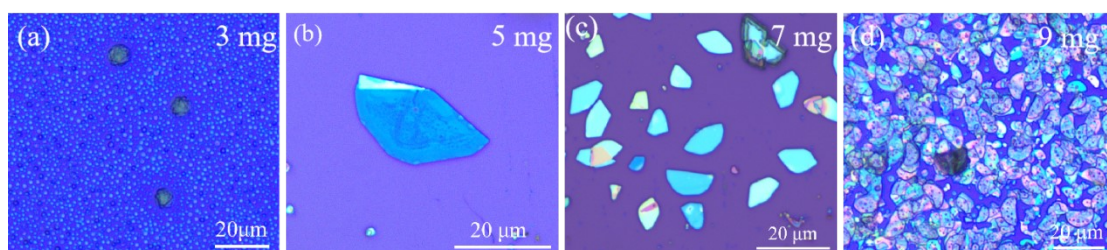


Figure S2. Optical micrographs of  $\text{NaCl}$  of different masses on the growth of  $\text{ZrS}_2$  nanosheets.

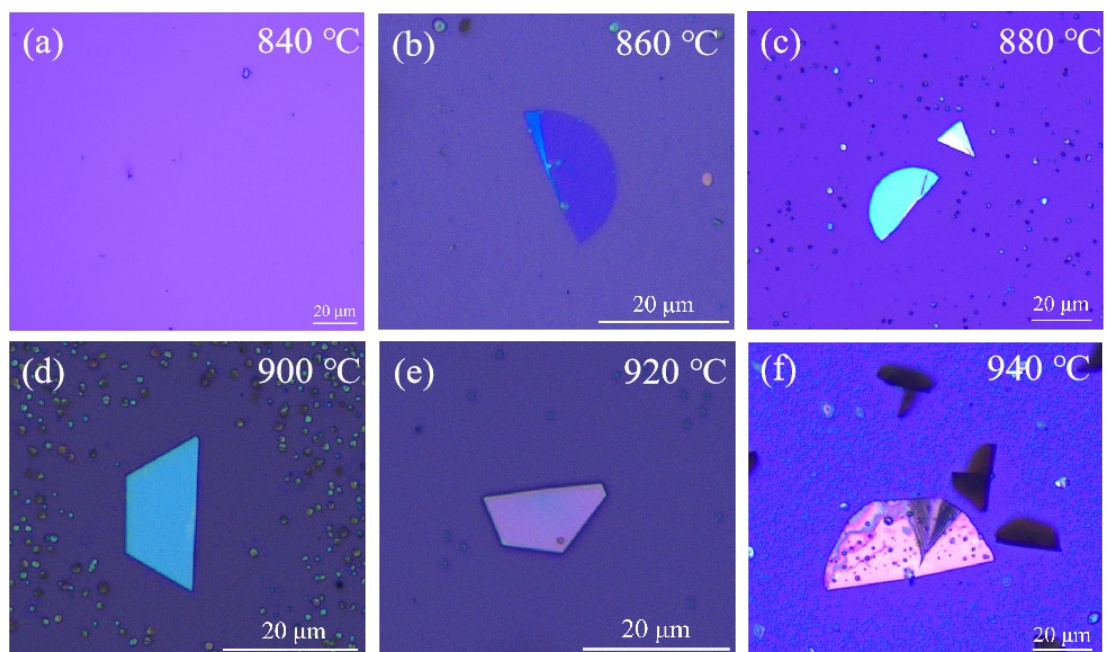


Figure S3. Optical micrographs of  $\text{ZrS}_2$  nanosheets at different growth temperatures.

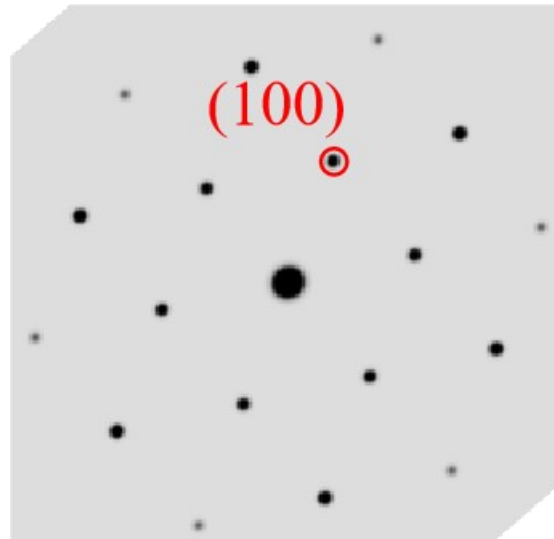


Figure S4. Selected electron diffraction patterns simulated along the [001] direction.

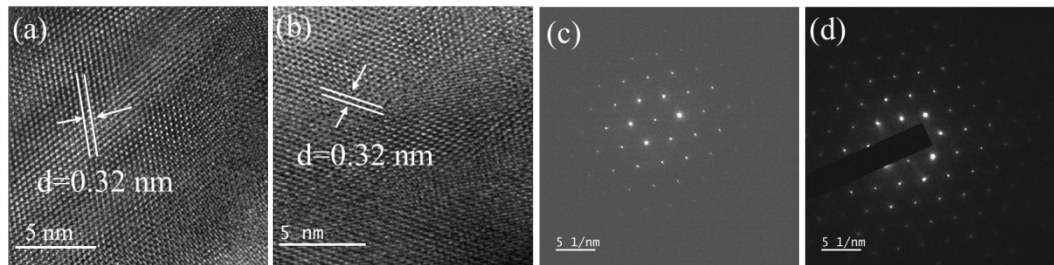


Figure S5. The high-resolution TEM patterns and the SAED patterns of other regions of this ZrS<sub>2</sub> nanosheet.

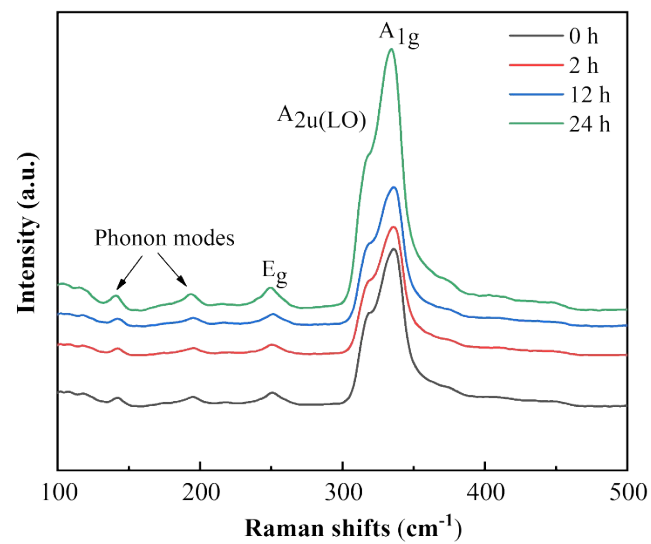


Figure S6. Raman spectra of ZrS<sub>2</sub> nanosheets in air at different times.

Table S1 Performance comparison of FETs based on ZrS<sub>2</sub>.

Ref.	The carrier mobility	The on/off ratio	substrate
1	0.01-5 cm <sup>2</sup> ·V <sup>-1</sup> ·s <sup>-1</sup>	~10 <sup>5</sup>	h-BN
2	0.1-1.1 cm <sup>2</sup> ·V <sup>-1</sup> ·s <sup>-1</sup>	-	h-BN
3	0.1-0.8 cm <sup>2</sup> ·V <sup>-1</sup> ·s <sup>-1</sup>	-	Si/SiO <sub>2</sub>
This work	2.03 × 10 <sup>-3</sup> cm <sup>2</sup> ·V <sup>-1</sup> ·s <sup>-1</sup>	~10 <sup>2</sup> -10 <sup>3</sup>	Si/SiO <sub>2</sub>

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